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Reply To: 3420 | Date: November 8, 1991

Subject: Biological Evaluation of Seedling Mortality in Stand 29-17, Scott River RD, Klamath NF (FPM Report N91-17)

To: Forest Supervisor, Klamath NF

On October 15, 1991, Linda Haugen, Plant Pathologist trainee, and I visited with Rick Svilich, Silviculturist, and Jim Kilgore, Culturist, Scott River Ranger District, to examine seedling mortality in plantation 29-17 (T. 44 N., R. 11 W., sections 7-8) in Middle Creek compartment. This 31-acre plantation was planted in 1984 with ponderosa pine, Douglas-fir, and incense-cedar. The previous natural stand contained ponderosa pine, sugar pine, Douglas-fir, incense-cedar, and black oak. It was harvested and the site burned in 1983.

This past spring District personnel noted several pockets of dead ponderosa pines and Douglas-firs. They suspected that a root disease might be involved in the mortality because of the clumped nature and requested FPM assistance.

We examined the roots of both pine and Douglas-fir that had died. On both species the tap root and many of the primary laterals had popcorn conks of Heterobasidion annosum. The mortality was centered around large (>30 inches diameter) ponderosa pine stumps from the previous stand. We examined these stumps and found fresh fruiting bodies of the fungus. We incubated the root systems of several dead Douglas-fir and ponderosa pine seedlings that we had collected to confirm that annosus root disease was present. All of the root systems still had evidence of viable H. annosum.

Annosus root disease is a common mortality agent of pine on dry sites in eastside pine and low elevation mixed conifer stands. It is not as commonly seen affecting Douglas-fir in California. This site has a south-facing aspect and appears to be relatively dry. It is likely that this site is conducive to annosus root disease and that the proximity of planted Douglas-fir to the large pine stumps resulted in infection and mortality of the Douglas-fir as well as ponderosa pine.

Although the disease was not apparent in the original or surrounding stands, sufficient inoculum was present to infect the newly created pine stumps in 1983. Most likely the level of inoculum is as high or probably higher now than it was then and any newly created pine stumps have a good probability of becoming infected.

Annosus root disease infects most species of conifers in California. There are two strains or biological species of the fungus in California, one on resinous species such as pines and one on non-resinous species such as true firs. The strain on pines, P type, does not appear to infect live true firs and the fir strain, S type, does not infect living pines. The two strains function somewhat

differently in their respective hosts. The P type advances in the cambium region and appears to result in more rapid mortality of the host. The S type functions more as a wood decay fungus and causes root and butt decay and slower mortality, except in small trees. The strain in this stand is most likely the P type.

The common entry into stands of P type H. annosum appears to be through the stump surfaces of freshly cut pines. Once established in a stump the fungus grows into the root system and can infect surrounding host trees through root contacts. The fungus is relatively persistent on a site once established. The size of the infected stump and the size of infected residual trees influences the longevity of the fungus on the site. Persistence of 2 to 3 decades on this site can be expected. Because of the small size of the regeneration in this stand, underground spread of the fungus will be limited to the size of the root systems of the infected stumps.

There is no feasible action that can be taken in stand 29-17 to reduce losses from the existing centers of annosus root disease. These centers will continue to have seedling mortality around them for a number of years, but all seedlings within the root zone of the stump will likely not be killed. There will be some escapes because of the rooting pattern of the stump and the lack of spread of H. annosum into all of the root system. Because of the small size of the seedling root systems, they will neither carry the fungus beyond the root zone of the stump nor prolong the longevity of the fungus on the site. The effect of the fungus on surrounding conifers will begin to recede as the fungus utilizes its food source and becomes more limited to the woody stump mass. Tree mortality should end in 10 years or so. The small openings created by the root disease will likely result in the surrounding, surviving trees maintaining their growth longer than those in unaffected parts of the plantation because of the lack of intertree competition. The small openings will naturally regenerate with conifers in time. The limited size of the openings will probably result in little to no reduction in timber volume produced on this site.

Although there are no opportunities to address the root disease situation in stand 29-17, the occurrence of annosus root disease on this site indicates that similar sites in the area will probably also become infested following harvesting activities. Future timber sales in this area on drier sites should consider stump treatment as a preventive action to reduce infection by H. annosum. The currently accepted treatment is the application of granular borax to pine stumps within 2 days of felling, preferably sooner.

FPM is available to provide assistance on annosus root disease prevention when the District begins planning any sales in this area or similar areas on the District where annosus root disease may be a concern. We can be reached at the Shasta-Trinity S.O. at (916) 246-5101.

/s/ Gregg DeNitto

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